

THE INDO-PACIFIC PIPEFISH GENERA *NOTIOCAMPUS* GEN. NOV. AND *NANNOCAMPUS* GÜNTHER

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Abstract.—*Notiocampus* (type-species: *Nannocampus ruber* Ramsay and Ogilby) is described from Australia. A revised diagnosis is given for the superficially similar *Nannocampus* Günther, and its recognized species (*N. subosseus* Günther, *N. elegans* Smith) are redescribed; all treated species are illustrated.

Study of an Australian pipefish identified as *Nannocampus ruber* Ramsay and Ogilby showed it to differ markedly from other species of *Nannocampus* Günther, and this prompted examination of other material referred to this poorly known syngnathine (tail pouch) genus. As a result, I here redescribe *N. ruber*, refer it to a new genus, and provide a revised diagnosis of *Nannocampus* together with brief descriptions of the two species therein recognized. Material is, in most cases, limited, and additional specimens may eventually warrant emendation of diagnoses and descriptions. However, present data clarify or correct early descriptions and should facilitate future study of these relatively uncommon Indo-Pacific pipefishes. Taxa treated here are in part characterized by the lack of pectoral and anal fins in subadults and adults, but pectoral fins may well be present in larvae. Dawson and Allen (1978) have shown that certain pipefishes that lack dorsal and pectoral fins as adults have these fins developed in pouch and/or planktonic larvae. Similarly, pectoral fins are present in planktonic larvae but absent in adults of the North Atlantic genus *Nerophis*. In the absence of larval specimens, present generic diagnoses apply only to juveniles or adults.

Counts and measurements follow Dawson (1977) and are based on the material examined; color descriptions are from specimens preserved in alcohol. Abbreviations for repositories of examined material follow: AMS, Australian Museum, Sydney; BMNH, British Museum (Natural History); GCRL, Gulf Coast Research Laboratory Museum; NMW, Naturhistorisches Museum, Wien; SAM, South Australian Museum, Adelaide; WAM, Western Australian Museum, Perth; ZMA, Zoölogisch Museum, Amsterdam.

Notiocampus, new genus

Type-species.—*Nannocampus ruber* Ramsay and Ogilby, 1886.

Diagnosis.—Superior trunk and tail ridges confluent; lateral tail ridge ab-

sent; inferior trunk and tail ridges discontinuous near anal ring; lateral trunk ridge confluent with inferior tail ridge; body slender, elongate, its depth 3–4 in head length (HL); trunk nearly round in section; venter but slightly V-shaped, without prominent median ridge or keel; dorsum and venter of tail somewhat convex; scutella inconspicuous, without longitudinal keels, their width less than half of ring length. Head length 15–16 in standard length (SL); median dorsal snout ridge low, entire, originates on posterior half of snout, terminates on interorbital; opercle smooth to minutely striate; head elsewhere without prominent ridges or ornamentation; body ridges and rings inconspicuous, devoid of spines, serrations or dermal flaps; dorsal-fin origin on tail, fin base not elevated, its length more than 3 in HL; pectoral and anal fins absent, caudal fin present; total rings 66–68; nares with two widely spaced pores of unequal diameter; brood pouch unknown, presumably sub-caudal; without odontoid processes in jaws (Dawson and Fritzche, 1975). Maximum size at least 151 mm SL; Indo-Pacific, marine.

Comparisons.—Among pipefishes with confluent superior trunk and tail ridges, *Notiocampus* exhibits a unique combination of characters (e.g. pectoral and anal fins absent, caudal fin present, dorsal fin located on tail, confluent lateral trunk and inferior tail ridges). This ridge configuration and absence of pectoral and anal fins is shared with adults of *Penetopteryx* Lunel and *Apterygocampus* Weber but those forms lack the dorsal fin in adults and have total ring counts of 45–61 (dorsal fin present in *Notiocampus*, total rings 66–68). The North Atlantic or European *Entelurus* Duméril and *Nerophis* Rafinesque also lack pectoral and anal fins in adults but *Entelurus* has 28–31 trunk rings and the dorsal fin is mainly on the trunk (trunk rings 18–19, dorsal fin on tail in *Notiocampus*). Further, *Nerophis* lacks the caudal fin (present in *Notiocampus*). *Nannocampus* shares the fin complement of *Notiocampus* but total rings are less (47–56 against 66–68) and inferior trunk and tail ridges are confluent rather than discontinuous.

Etymology.—From the Greek *notios* (southern) and *kampos* (sea-animal), in allusion to the southern hemisphere habitat of the type-species. Gender: masculine.

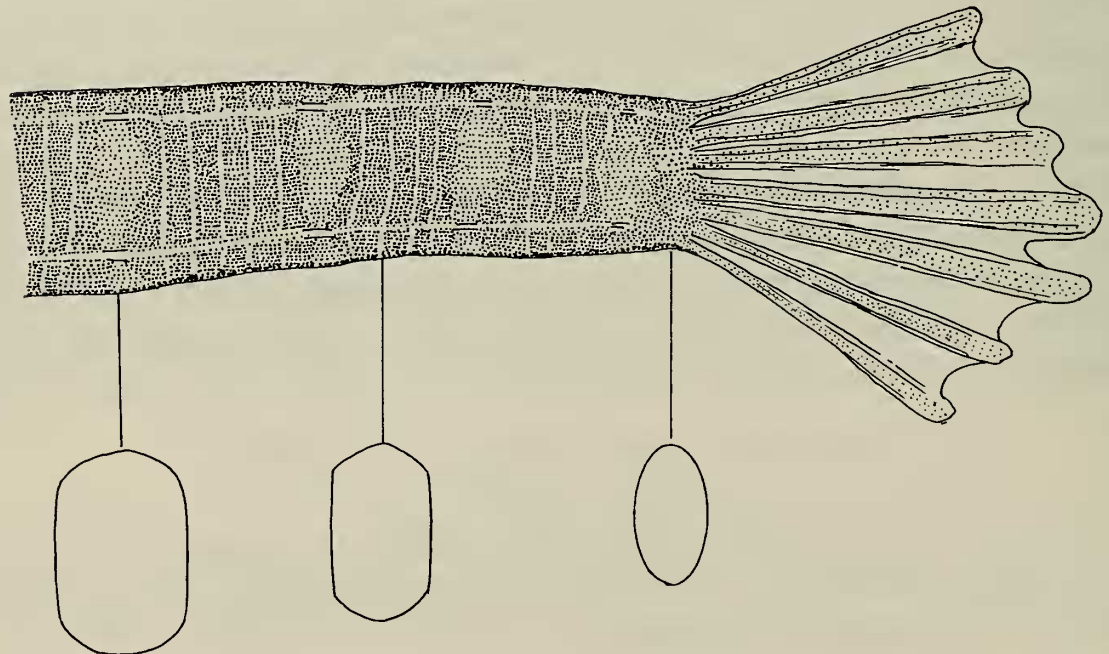
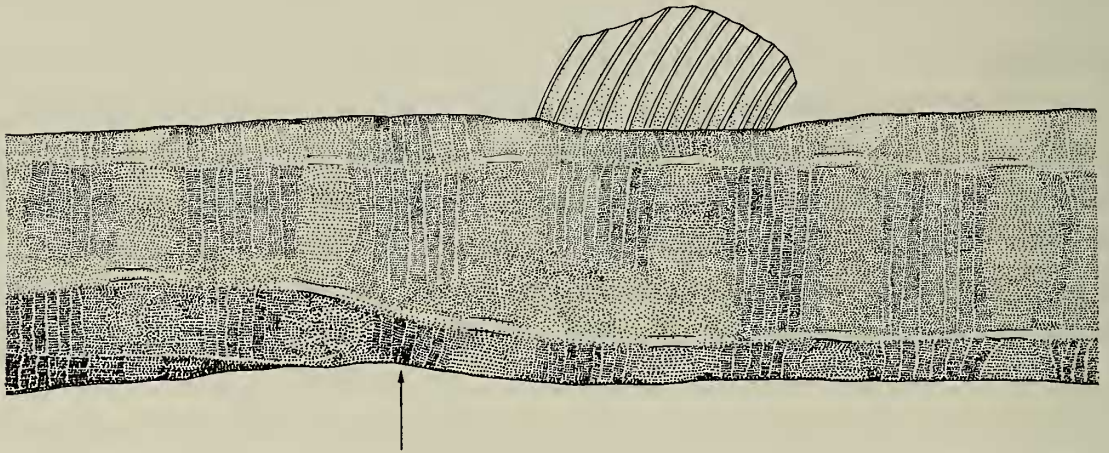
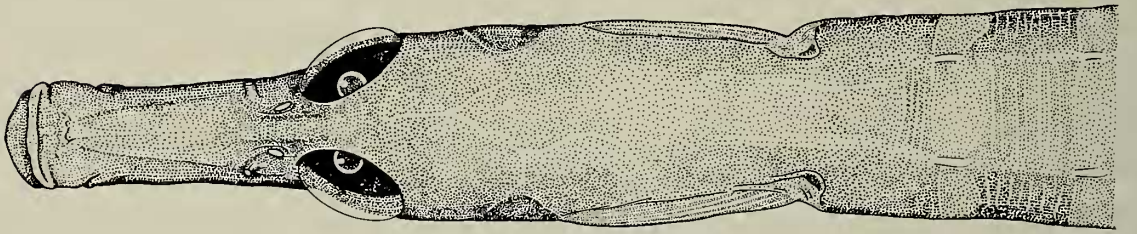
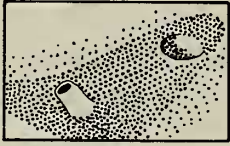
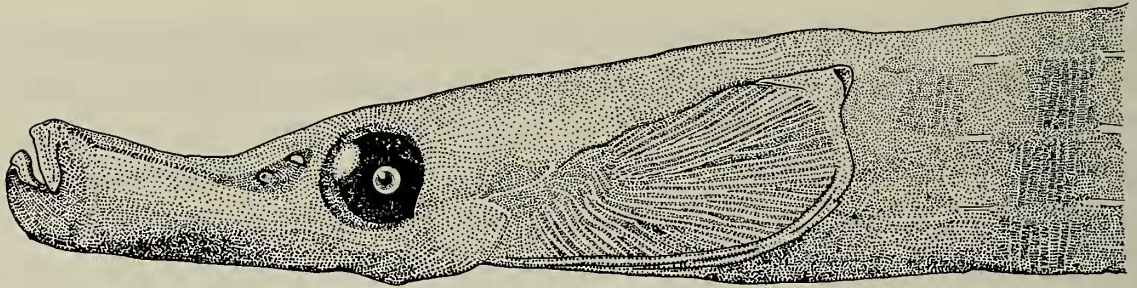
Remarks.—To my knowledge, there are now only three specimens referable to this genus in collections. It is evident that these forms are not commonly taken by usually employed methods (nets, ichthyocide) and they may prove to be cryptic species wherein adults occupy the interstices of rock or coral rubble.

Notiocampus ruber (Ramsay and Ogilby)

Figs. 1 and 2

Nannocampus ruber Ramsay and Ogilby, 1886:757 (original description; Shark Reef, Port Jackson, New South Wales, Australia).

Diagnosis.—See generic diagnosis.



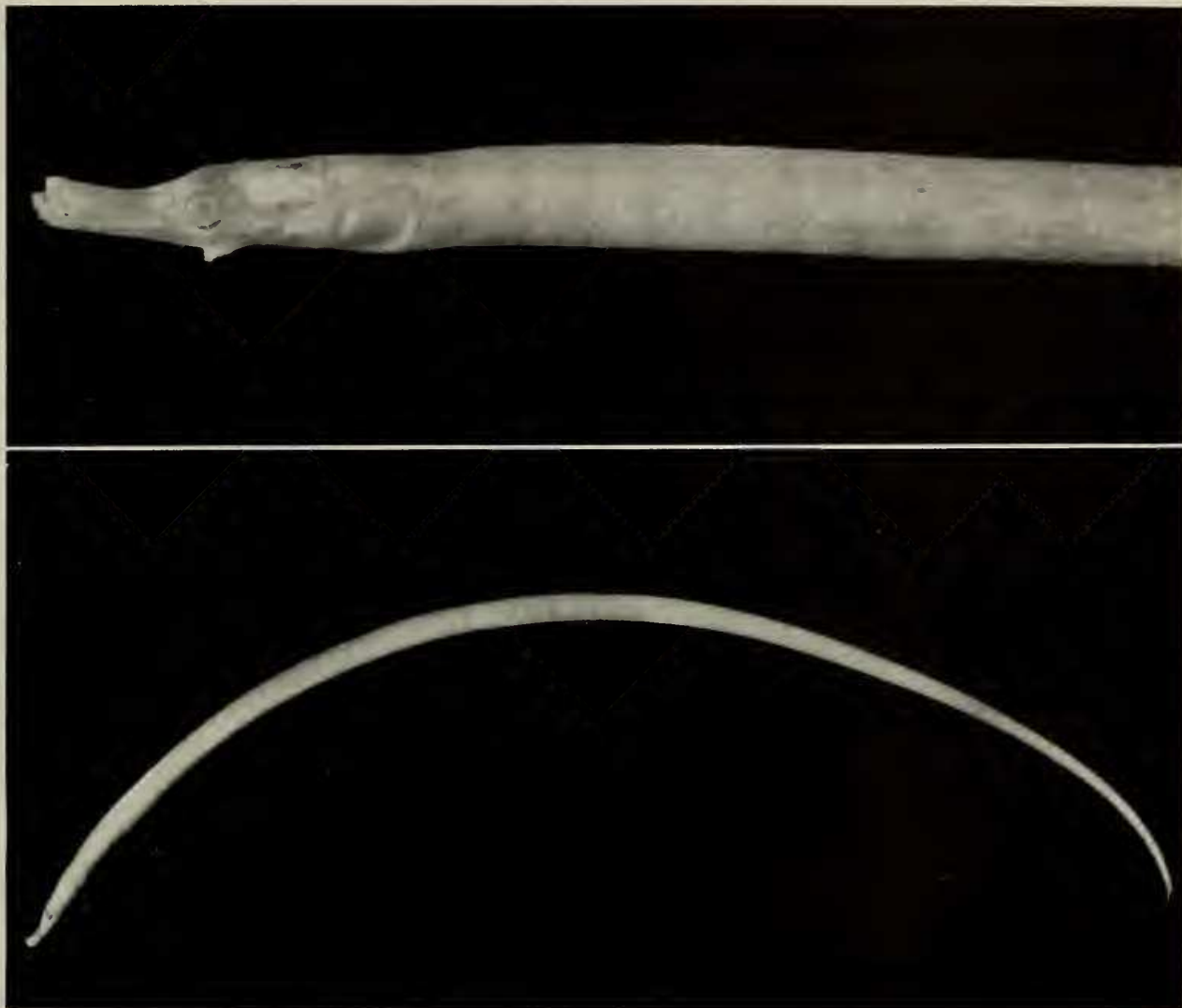


Fig. 2. *Notiocampus ruber*. **Top:** AMS B.9199 (110 mm SL, holotype). **Bottom:** AMS I.20167-013 (151 mm SL).

Description.—Counts and measurements (mm) of 110 mm SL holotype are followed (in parentheses) by those of 151 mm SL specimen from Kangaroo I.: trunk rings 19 (18), tail rings 49 (48), dorsal-fin rays 11 (13), total subdorsal rings 1.5 (1.25), caudal-fin rays 6 (7), HL 7.5 (9.3), snout length 2.9 (3.3), snout depth 0.9 (1.0), length of dorsal-fin base 2.1 (2.6), depth at anal ring 1.9 (2.7), trunk depth 2.0 (2.9). Dorsal-fin origin at rear margin of 1st tail ring in holotype, about $\frac{1}{4}$ of ring length behind anterior margin of 1st tail ring in 151 mm fish and at anterior margin of 1st tail ring in a 3rd (damaged) specimen. Median dorsal snout ridge terminates on interorbital,

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Fig. 1. *Notiocampus ruber*. **Upper pair**—Lateral and dorsal aspects of head and anterior trunk rings with detail of left naris. **Lower pair**—*Top:* Posterior trunk and anterior tail rings illustrating ridge pattern and dorsal fin; arrow locates anal ring. *Bottom:* Posterior tail rings and caudal fin with diagrams of selected section areas. From AMS I.20167-013.

not confluent with orbital ridges. Nares (Fig. 1), bilaterally, with large simple pore above, well separated from a minute pore on slender anteroventral tubiform process. Posterior tail rings not narrowed above and below to form keel-like ridge.

The fresh holotype was described as "red with some minute white spots." The holotype and Kangaroo I. specimen are now light tan without evidence of spots or other persistent markings.

Remarks.—The three study specimens are presumably females. Whitley (1941) reported the presence of "thick mucus canals" on the head of the holotype. I find no such canals, nor is there evidence of a mucous coating which often occurs in some preserved pipefishes, especially in species of *Corythoichthys* Kaup. The holotype, now in two pieces, has the dorsal fin adnate to dorsum and fin rays are difficult to count with certainty. There seem to be 11 rays as originally described but 12 pterygiophores may be present. The specimen reported by Glover (1968) is now dried, part of the tail is missing, and dorsal-fin rays cannot be counted accurately.

Although noting differences in dorsal-fin length and a "reduced" caudal fin, Whitley (1941) mistakenly referred a specimen labeled "South Head, Sydney" to *Nannocampus ruber*. This fish (AMS IB.560), now 129 mm TL, has 19 + 54 rings, 29–30 rays in the damaged dorsal fin and 2 + 5.25 sub-dorsal rings; median dorsal snout ridge confluent with supraorbital ridges; superior body ridges confluent; lateral trunk ridge indistinct, possibly confluent with inferior tail ridge; pectoral and anal fins absent; caudal fin absent; last 5–6 tail rings poorly defined, gradually decreasing in length, laterally compressed and margined above and below by a keel-like ridge which continues around tip of tail. This specimen clearly differs from *N. ruber* in a number of characters, whereas general morphology and counts agree closely with *Nerophis lumbriciformis* (Jenyns). This fish may represent an undescribed Australian species, but I believe that it is a mislabeled *Nerophis* of European origin.

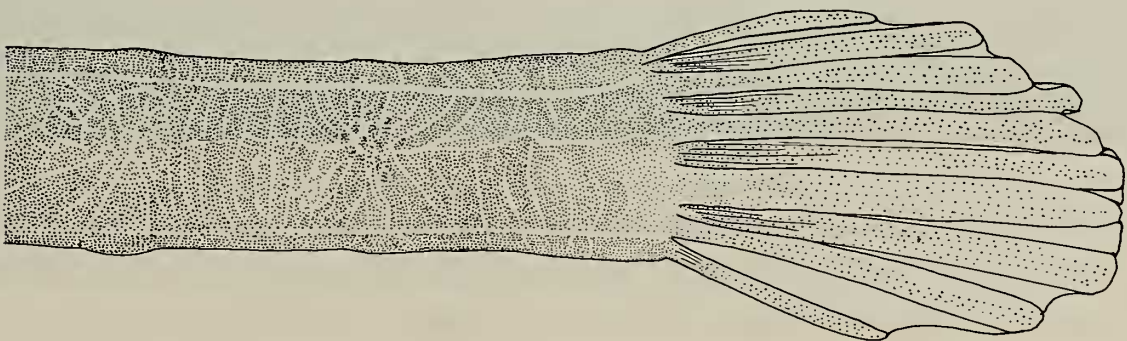
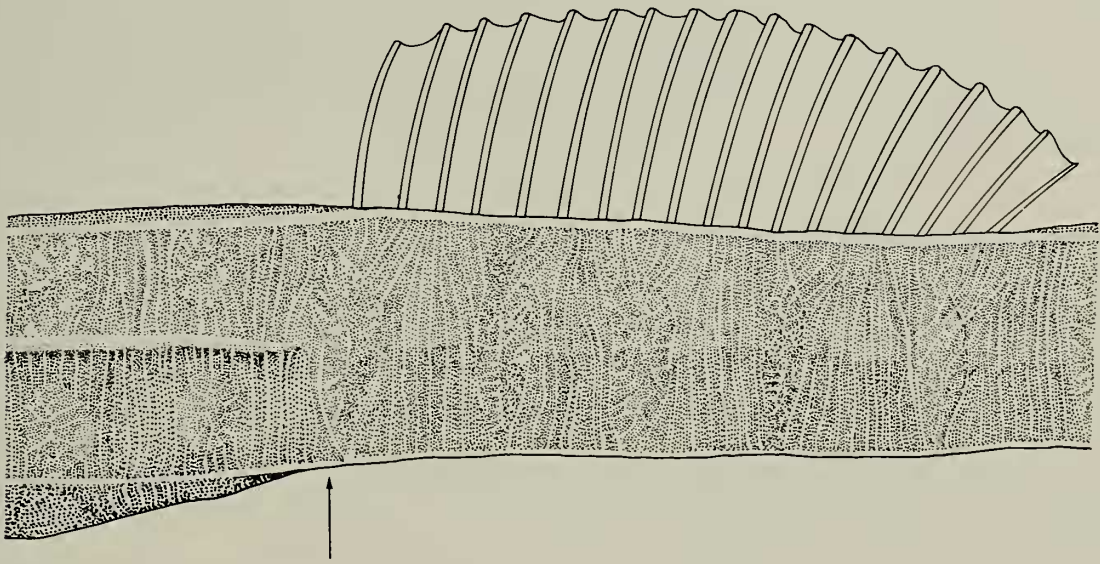
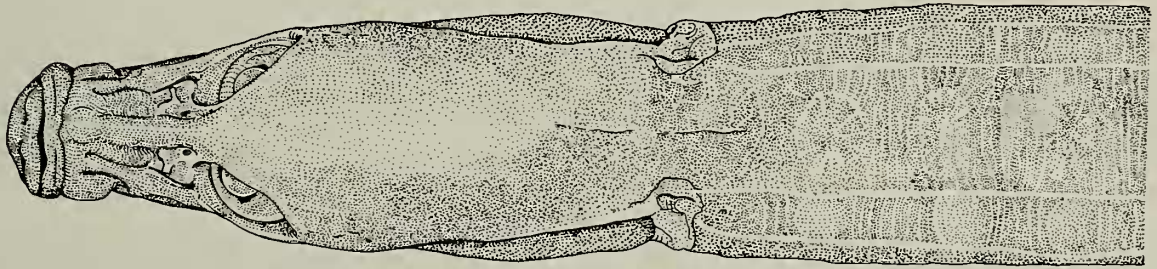
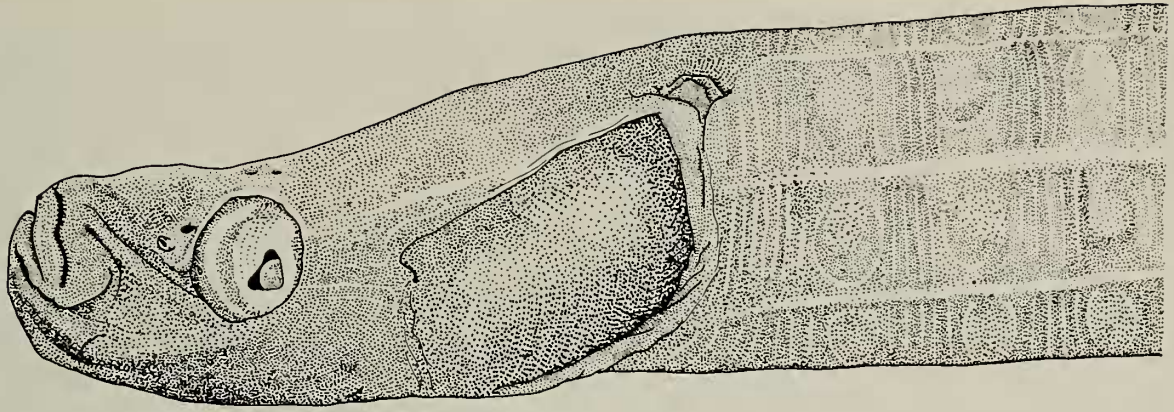
Comparisons.—See generic diagnosis.

Distribution.—Known only from New South Wales and South Australia. One specimen (SAM F.3220) was taken in a "craypot," another (AMS I.20167-013) taken with SCUBA from a "rocky ledge" at a depth of 15 meters.

Material examined.—AMS B.9199 (110 mm SL, presumably female, ho-

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Fig. 3. *Nannocampus subosseus*. **Upper pair**—Lateral and dorsal aspects of head and anterior trunk rings. **Lower pair**—*Top*: Posterior trunk and anterior tail rings illustrating ridge pattern and dorsal fin. *Bottom*: Posterior tail rings and caudal fin. From WAM P.25758-023 (77.5 mm SL, female).



lotype), Australia, New South Wales, Port Jackson, Shark Reef, 1885. AMS I.20167-013 (151 mm SL), South Australia, Kangaroo I., 35°37'S, 137°15'E, 1978, H. Larson. SAM P.3220 (ca. 130 mm, damaged), South Australia, Cape Jaffa, 1964, I. R. McInnes.

Nannocampus Günther

Nannocampus Günther, 1870:178 (type-species by original designation: *Nannocampus subosseus* Günther, 1870).

Diagnosis.—Superior trunk and tail ridges confluent; lateral tail ridge absent; inferior trunk and tail ridges confluent; lateral trunk ridge ends, with or without deflection ventrad, near anal ring; body moderately slender, its depth 2.4–3.2 in HL; trunk not round in section, venter V-shaped, without median ridge or keel; dorsum of tail mainly flat, venter slightly convex; scutella inconspicuous, without longitudinal keels, their width less than half of ring length. Head length 10–15 in SL; median dorsal snout ridge low to distinctly elevated above dorsal margin of orbit, entire, originates on anterior third of snout, confluent behind with anterior continuations of supraorbital ridges; opercle smooth to finely striate or pocked with minute depressions; head elsewhere without prominent ridges or ornamentation; body ridges and rings inconspicuous, devoid of spines, serrations or dermal flaps; dorsal-fin origin near anal ring, fin base somewhat depressed between superior ridges; pectoral and anal fins absent; caudal fin rather well developed, usually with 10 fin rays; total rings 47–56; nares with 2 separated but not widely spaced pores of subequal diameters; brood pouch subcaudal, pouch plates and dermal folds present, pouch closure unknown; without odontoid processes in jaws. Maximum size at least 110 mm SL; Indo-Pacific, marine.

Comparisons.—See under *Notiocampus* above.

Nannocampus subosseus Günther

Figs. 3 and 4

Nannocampus subosseus Günther, 1870:178 [original description; Freycinet's Harbour (Western Australia)].

Nannocampus weberi Duncker, 1915:99 [original description; Malé Kuba Bay, Sumba I. (Indonesia)].

Diagnosis.—Lateral trunk ridge not deflected near anal ring; total rings 47–50; dorsal-fin rays 14–18.

Description.—Rings 15 + 32–35; total subdorsal rings 3.0–4.25; dorsal-fin origin on posterior $\frac{1}{4}$ of anal ring in holotype, at rear margin of anal ring and anterior $\frac{3}{4}$ of 1st tail ring in two other Australian specimens. Median dorsal snout ridge usually elevated above dorsal rim of orbit; lateral trunk ridge ends between middle and posterior margin of anal ring.

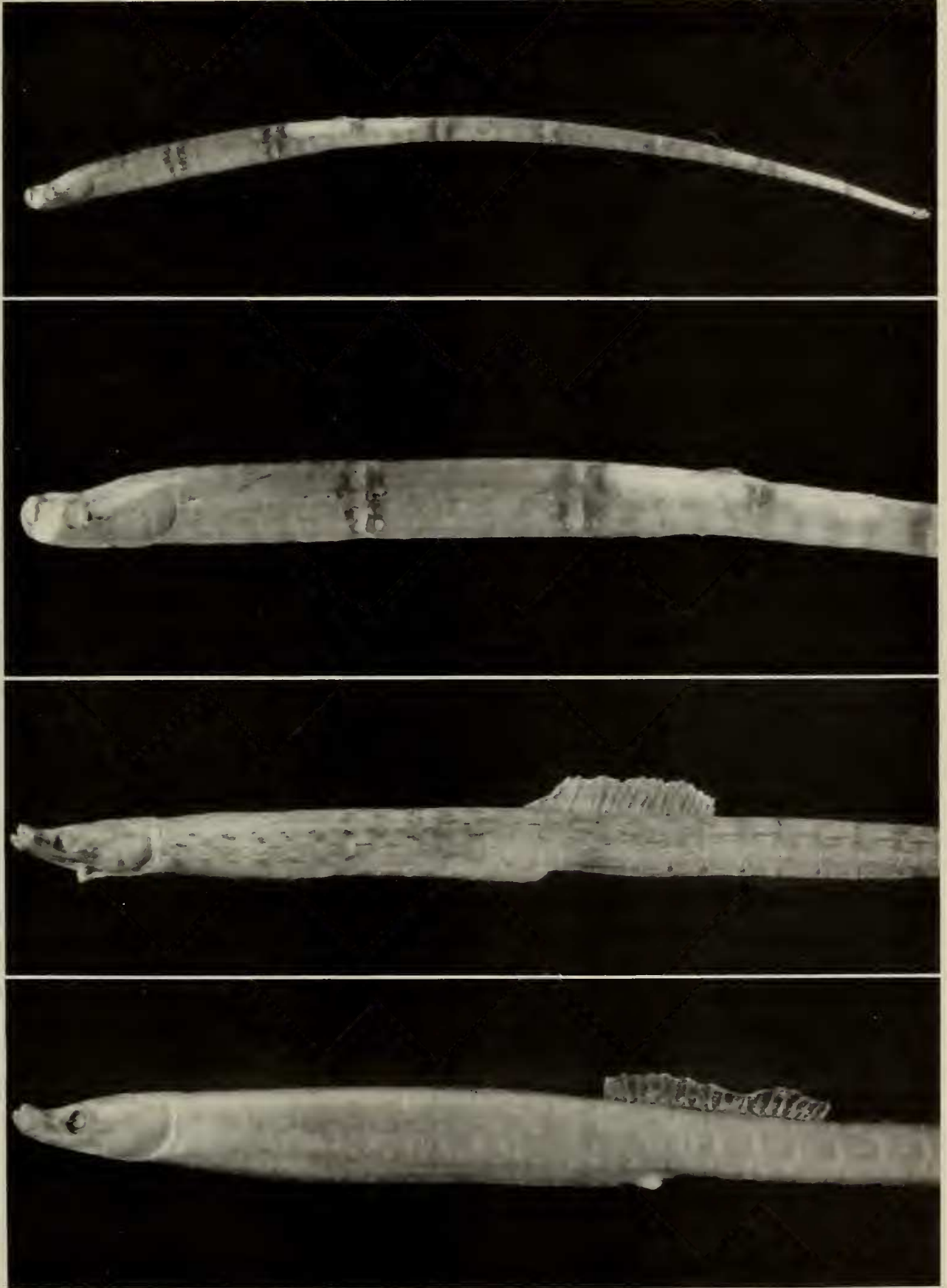


Fig. 4. **Upper pair:** *Nannocampus subosseus* WAM P.25758-023 (77.5 mm SL, female). **Lower pair:** *Nannocampus elegans* GCRL 15963 (top, 101 mm SL, male; bottom, 93.5 mm SL, female).

Ground color brown to dark brown; lower jaw and maxilla brown; premaxilla, median snout ridge and most of dorsum of head pale to tan; side and venter of snout crossed by broad near-white band extending below level of nares; upper half of orbit margined by series of short dark brown bars, of which one crosses interorbital; upper $\frac{1}{3}$ of opercle brown with irregular short dark brown streaks, remainder of opercle and underside of head brown; trunk and tail with about six diffuse dark margined brown bars crossing dorsum and sides, bars about $\frac{1}{2}$ of ring width and spaced 5–6 rings apart; upper $\frac{1}{3}$ of side and dorsum pale between 13th and 20th rings; posterior $\frac{1}{3}$ of tail mainly light tan with irregular darker bars between rings; dorsal-fin rays flecked with brown; caudal fin brown with pale margin (color description from WAM P.25758-023).

Comparisons.—See this section under *N. elegans*.

Remarks.—Günther (1870), Duncker (1915) and Weber and de Beaufort (1922) failed to describe the lateral trunk ridge of the dried holotype (BMNH 1868.12.27.57), but Palmer (1954) reported that the specimen had been transferred to alcohol and that the lateral ridge ends on the last trunk ring. The holotype, now 85 mm (originally 90 mm total length), lacks some posterior tail rings and the caudal fin, retains no evidence of original coloration, and is preserved in alcohol. Well-developed pouch plates extend below 13 tail rings but pouch folds have evidently been lost during preservation. My counts and measurements (mm) follow: trunk rings 15, tail rings remaining 33, subdorsal rings $0.25 + 2.75$, HL 7.4, snout length 2.0, snout depth 2.0, length of dorsal-fin base 4.8, anal ring depth 3.1, trunk depth 3.4.

Weber (1913) reported a specimen (as *subosseus*) from Indonesia which Duncker (1915) described (without examination) as *N. weberi* on the basis of differences from *subosseus* in published counts of rings and subdorsal rings. My counts and measurements (mm) of the 54.5 mm SL holotype of *N. weberi* follow: rings $15 + 32$, dorsal-fin rays 18, subdorsal rings $0.5 + 3.75$, caudal-fin rays 10, HL 5.4, snout length 1.6, snout depth 1.1, length of dorsal-fin base 4.4, anal ring depth 2.1, trunk depth 2.7. This presumably juvenile specimen generally agrees with examined *N. subosseus* in all characters except the tail ring count (32 against 35 in undamaged *subosseus*) and in the lateral configuration of the snout. The dorsal margin of the snout is straight to somewhat convex in *N. subosseus* (ca. 71–90 mm SL), whereas the margin is convex in the holotype of *N. weberi* and the snout ridge fails to reach the level of the dorsal rim of the orbit (reaches to or above rim in other *subosseus*). The difference in the tail ring count is within expected variation and the concave snout may reflect the juvenile condition. In the absence of additional distinguishing features and lack of adequate study material, I provisionally refer *N. weberi* to the synonymy of *N. subosseus*.

Distribution.—Western Australia and Indonesia. One Australian specimen was taken in a “rockpool”; the Indonesian fish was collected “on reef.”

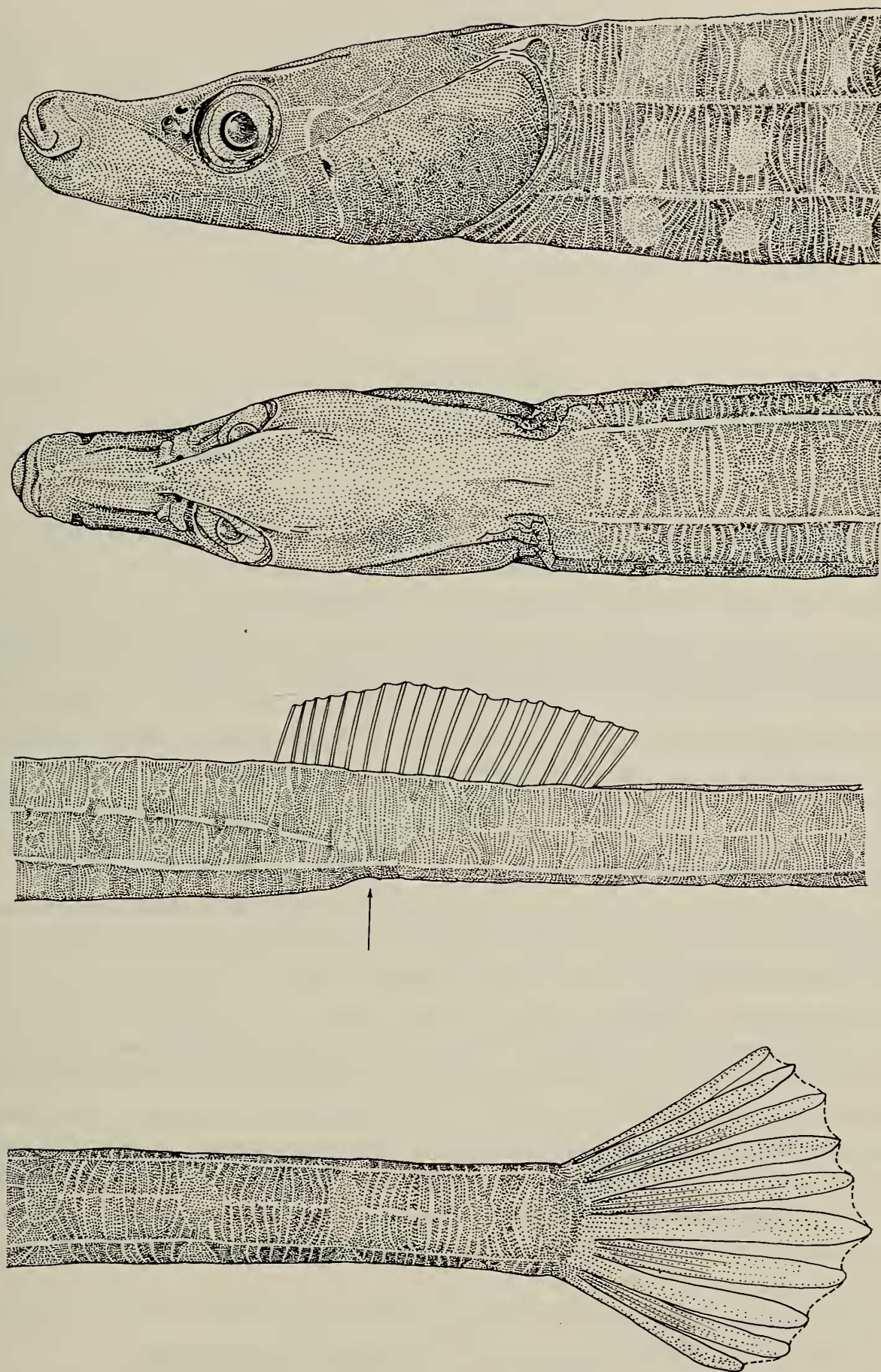


Fig. 5. *Nannocampus elegans*. **Upper pair**—Lateral and dorsal aspects of head and anterior trunk rings. **Lower pair**—*Top*: Posterior trunk and tail rings illustrating ridge pattern and dorsal fin. *Bottom*: Posterior tail rings and caudal fin. From GCRL 15965 (82 mm SL, female).

Material examined.—Western Australia: BMNH 1868.12.27.57 (85 mm, damaged male, holotype), Freycinet's Harbour, HERALD; WAM P.25758-023 (1, 77.5), Rottneest I., Fish-hook Bay, 8 Mar. 1977, B. Hutchins; WAM P.25842-001 (1, 71), Houtman Abrolhos, Beacon I., rockpool 29 Aug. 1977, A. Lovell and H. Merrifield. Indonesia: ZMA 104.659 (54.5, juvenile, holotype of *N. weberi*), Sumba (Soemba) I., Bay of Malé Kava, on reef, 10 Feb. 1909, van der Sande.

Nannocampus elegans Smith

Figs. 4 and 5

Nannocampus (sp.) nov. Smith, 1951:53 (notice of undescribed species; Xora River to Inhambane, South-east Africa).

Nannocampus elegans Smith, 1961:516, fig. 355a [original description; Xora mouth northwards (SE Africa)].

Diagnosis.—Lateral trunk ridge deflected ventrad near anal ring; total rings 54–56; dorsal-fin rays 21–22.

Description.—Rings 14 + 40–42, subdorsal rings 2.0–1.25 + 3.75–4.25 = 5.5–6.0, caudal-fin rays 10 (see Smith, 1963 for additional counts). Proportional data based on five specimens, 56–106.5 mm SL (GCRL 15963–65), follow: HL in SL 12.4–15.0, snout length in HL 3.0–3.6, snout depth in snout length 1.1–1.8, length of dorsal-fin base in HL 0.7–0.9, anal ring depth in HL 2.4–3.2, trunk depth in HL 1.7–2.4. Median dorsal snout ridge low, not elevated to or above dorsal rim of orbit, snout concave in lateral profile; lateral trunk ridge deflected variably ventrad, may reach but not confluent with inferior ridge.

Ground color tan to brown; plain, or head and sides and dorsum of body irregularly streaked with fine brown lines or blotches; dorsal and caudal rays flecked with brown. For color in life see Smith, 1963.

Comparisons.—Higher counts of total rings (54–56 against 47–50) and dorsal-fin rays (21–22 against 14–18) as well as a more anterior dorsal-fin insertion (on 2.0–1.25 trunk rings against 0.5 trunk–0.75 tail rings) distinguish *N. elegans* from *N. subosseus*. The lateral trunk ridge is deflected to a greater or lesser degree in all *elegans* examined whereas this ridge ends without deflection in *subosseus*. In addition, the snout ridge is consistently low in *elegans* (distinctly elevated in *subosseus*) and preserved specimens of *elegans* lack the persistent pattern of bars and pale blotches found in *subosseus*.

Distribution.—According to Smith (1963), this species is not uncommon in tidepools from South Africa (34°S) to Inhaca, Mozambique.

Material examined.—South Africa: GCRL 15963 (2, 93.5–101); GCRL 15964 (1, 56); GCRL 15965 (2, 82–106.5); NMW 75533 (2, 78–96.5).

Acknowledgments

For permission to examine types or other specimens in their care I thank G. R. Allen and B. Hutchins (WAM), C. J. M. Glover (SAM), R. Hacker and P. Kähsbauer (NMW), H. Nijssen (ZMA), J. R. Paxton and D. F. Hoese (AMS) and A. C. Wheeler (BMNH). Special acknowledgment is due Margaret Smith, J. L. B. Smith Inst. of Ichthyology, Rhodes Univ., for the donation of specimens of *N. elegans*. Drawings are by Nancy Gordon.

This study was supported in part by National Science Foundation Grant BMS 75-19502.

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